

tury made revolutionary contributions as a consultant in mining. "Dr. Richards has innovation in the practice of the US uranium industry more than any other could give," advised.

AIME honored Richards in 1946, naming the Robert H. Richards award in the field of consulting geology.

Charles Augustus (Charlie) Steen, 1919-

Charles August (Charlie) Steen's discovery of pitchblende in the Chinle formation in southeastern Utah's Big Indian district changed the course of the US uranium industry. He proved that large, high-grade uranium ore deposits could be found on the Colorado Plateau. His discovery helped ignite the 1950s uranium boom and made the impoverished prospector-geologist a wealthy and world-famous figure.

In 1943, Steen graduated from the Texas College of Mines and Metallurgy at El Paso. He worked as a petroleum geologist in Bolivia and Peru before beginning his search for uranium in 1949. With his wife, M.L., and four young sons, Steen endured years of privation and hardship while he prospected the remote and desolate canyons and mesas of the Colorado Plateau. His four-year quest for uranium was not an erratic wandering. His search was based on his original geologic theory that uranium would be found concentrated along the flanks of anticlinal structures.

In 1951, Steen was drawn to the Lisbon Valley anticline where low-grade uranium occurrences in the Cutler Formation attracted his attention. Although the area had been condemned as uneconomic by government experts, he figured the better grade uranium would be encountered down-dip and further back from the meager rim outcrops. During the spring of 1951, he staked 12 claims covering this ground.

After raising a grubstake and obtaining a dilapidated, second-hand drilling rig from Bill McCormick, Steen had a 6-km (4-mile) road built into his property. In July 1952, he started drilling on his Mi Vida claim. At a depth of 21 m (70 ft), the drill cored through 4.2 m (14 ft) of a dark-colored sandstone unit in the Chinle Formation. This proved to be the first commercial discovery of uraninite ore in the United States.

Steen then staked more claims and sank a shaft near his discovery drill hole. He mined the first of more than 9 Mt (10 million st) of uranium ore, worth more than \$1 billion, that was produced from the Big Indian district during the next 30 years.

Steen's rags-to-riches story caught the imagination of the press and public, and he became famous as the country's uranium king. In 1953, Steen and Bill McCormick bought the Big Buck claims for \$2 million and formed the Standard Uranium Corp. to exploit the ore body adjacent to the Mi Vida Mine. In 1955, the pair formed the Uranium Reduction Co. and built the first privately financed uranium mill in the United States. In 1962, Steen sold the Mi Vida Mine and his interest in the Uranium Reduction to Atlas Corp.



Steen's venture was of some nature and a series of bad investments cost him most of his fortune. Also, a serious head injury curtailed his prospecting career. In 1992, Moab, UT honored Charlie and M.L. Steen with a celebration to mark the 40th anniversary of Charlie's discovery and to recognize the couple's many contributions to the Moab area.

Isaac Tyson Jr., 1792-1861

Pioneer Baltimore, MD industrialist Isaac Tyson Jr. was the Renaissance man of the early US minerals and chemicals industries. In an era when specialists were scarce, Tyson was geologist, mineralogist, assayer, mining engineer, metallurgist, industrial chemist, inventor, business manager, banker and economist. He recognized the need for a resource base to underpin industrial development. Between 1810 and the end of his life, every aspect of US resource development captured Tyson's interest.

Tyson fathered the American chromium industry, first as an exporter of chrome ore and then as a manufacturer of chromium-based chemicals. Chromium was only discovered in France in 1797. By 1810, Tyson had identified chromite in the Bare Hills near Baltimore and had begun to export it to chemicals plants in England.

Tyson's business grew slowly until 1827, when he discovered additional chromite deposits in Maryland and Pennsylvania. For the next 20 years, until major new deposits were discovered in Turkey, Tyson dominated world trade in chromite ore.

In 1845, Tyson founded the Baltimore Chrome Works. The plant continued to produce until 1985, a span of 140 years.

In 1827, Tyson obtained a patent for a new method for making copperas, an iron salt used in dyeing and as a disinfectant. The copperas patent led him to an interest in iron pyrite deposits. He later became associated with the backers of the major US iron pyrite mine, which at that time was located in South Strafford, VT.

The presence of chalcopyrite in the South Strafford ore prompted the group to attempt to smelt copper while also producing sulfur at the mine. During 1833 and 1834, Tyson was at South Strafford working toward that end. During these months, he devised the use of a hot-air blast, using anthracite fuel, to smelt copper. In 1834, Tyson obtained a patent for applying heated air to the smelting of copper ores.

Tyson's pioneering experiments at South Strafford led him to iron making. In 1837, he blew in a furnace at Plymouth, VT. This furnace, using charcoal as fuel, produced iron for 20 years.

During the 1830s and 1840s, Tyson worked to develop Maryland copper deposits. In 1850, he joined a group of investors in establishing the Baltimore Copper Smelting Co. in Baltimore. Tyson also helped find and finance lead, iron, manganese, copper and coal mines at numerous locations throughout New England and the Middle Atlantic states.

In the chemical industry, Tyson is best remembered as an innovative and pioneering industrial chemist. He was an American original and one of its great industrialists during the first half of the 19th century. ■

